

area. Much of Mr. Harrison's material is embodied in the present volume, having been personally communicated to the author and the associated contributors.

The earlier chapters deal with the physical and geological features of the area, and in them the student will find ample material for extended surveys, made easier by the careful descriptions and directions given. Debatable points are at times introduced, but where the author's conclusions run counter to those of other authorities, the actual field evidence in support thereof is submitted.

The development of flint implements, with illustrations drawn from those found by Mr. Harrison, and others, in this area, and the several epochs of the Stone age are next discussed, the seventh chapter being devoted to a description of the megalithic monuments which are to be found in the district. It is to be regretted that, in regard to the latter, more definite results have not been secured. Stone circles, dolmens, and the remains of *viae sacrae* are mentioned in a general way as being possible sites of prehistoric worship, but although the district teems with objects which may prove of the greatest value to the student of early Britain, and is situated in a home county, no one appears to have yet succeeded in discovering and elucidating alignments such as the labours of Sir Norman Lockyer have established for somewhat similar monuments in Cornwall, Devon, &c. Yet we read on p. 47 of recent vandalism which bids fair to obliterate for ever these unique traces of the early inhabitants of the district. Surely the time has now arrived when a Government which carefully preserves records of ancient Babylon and Egypt should take effective steps to protect the only records we have of prehistoric Britain.

The remainder of the book deals with the general history of the Ightham district, and is pregnant with interest both for the historian and the general reader. The illustrations are from excellent photographs taken especially for this work, and one puts the book down with a deep feeling of regret that similar records for the scores of other interesting areas in which rural England abounds are as yet unwritten.

W. E. R.

The Wit of the Wild. By E. Ingersoll. Pp. xi+288; illustrated. (London: Unwin, 1907.) Price 6s. 6d. net.

As Mr. Ingersoll is always interesting and generally accurate, his writings may be commended to the attention of the reader in a manner which would not be safe in the case of all works on popular natural history. To recapitulate the titles of the two dozen articles which go to form the present volume will be unnecessary—more especially as some of them are of a rather cryptic nature—and it must accordingly suffice to mention that they cover a wide field, ranging from an account of the jelly-fish picturesquely named the "Portuguese man-of-war" to an inquiry whether animals can rightly be charged with suicidal propensities. All have appeared in the form of periodical literature, but they are none the worse for this, especially as many were first published in America. The article in which we have been most interested is one on the death-feigning instinct in the opossum—an instinct which in this particular case the author suggests has been inherited from long dead ancestors to the animal's own disadvantage. That the "collapse" which occurs when an opossum is suddenly seized is not due to some form of hysteria the author is firmly convinced; and if it be a death-feigning instinct designed for protection it certainly fails in its object, as the unhappy creature is mauled and done to death by quite a number of animals when in this condition.

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The reader should, however, peruse the chapter for himself, in order to form his own judgment, and having done this he will scarcely "skip" the remainder of a very interesting volume.

(1) *Technical Electricity.* By H. T. Davidge and R. W. Hutchinson. Pp. x+502. (London: University Tutorial Press, Ltd.) Price 4s. 6d.

(2) *Elementary Electrical Engineering.* By John H. Shaxby. Pp. vii+192. (London: Blackie and Son, Ltd.) Price 3s. net.

(1) This book is intended chiefly for the use of students of electrical engineering, and covers the London City and Guilds preliminary examination in electric lighting and power, and also the necessary technical work for stage ii. of the Board of Education examination in magnetism and electricity.

The question of the various units and systems of units has been given very careful attention, and the absolute and practical units are taken side by side so as to enable the student thoroughly to understand the relationships between them, and should help to mitigate the difficulties which generally arise when dealing with these units. The same idea is applied in the description of the construction of laboratory and practical measuring instruments, all the most modern forms which are in present-day use being carefully described, both as to their construction and action.

Examples of calibration and testing are fully given, but perhaps chapter xxiv., on "indoor wiring and jointing," is one of the best. This subject is so fully dealt with and clearly explained by diagrams showing the various systems of wiring that it is one of the chief chapters in the book, although it need not be taken up for either of the examinations mentioned above.

(2) Mr. Shaxby has written a book which he hopes will assist the home reader and evening-class student. The latter mostly consist of men who during the day are employed on electrical machinery, the theory of which is little known to them. Consequently, Mr. Shaxby has written his book in the simplest and clearest manner, and mathematics are avoided as much as possible. The first part of the book deals chiefly with the theoretical side of electrical work, and the question of primary batteries is very fully gone into.

Alternating-current machinery is so very largely employed in works and mills at the present day that it does not surprise us to find the author devoting three chapters to the subject of alternating currents and alternating-current machinery. The author gives an adequate but simple explanation of their chief properties, and also supplies illustrations of modern generators and motors.

J. L. M.

Neinia, Denkversuche. By O. K. Kremer. Pp. 420. (Vienna and Leipzig: E. Beyers, 1907.)

THIS book is not likely to appeal to many readers of NATURE. "Neinia," or *Nein*, represents the wish of the author to recognise any and every point of view as equally legitimate, although he personally professes to be an enemy of mystic metaphysics and a friend of materialism. He belongs to no particular philosophical school, but desires to think merely for the sake of thinking, without intending to prove any more or less unconsciously preconceived notions. This thinking cannot lead to any positive conclusion, and the book ends, characteristically enough, first with the sentence, "I believe nothing and therefore I believe everything," and then with the colophon, "U.S.W. *ad inf.*" The author claims for his book the advantage that one may begin to read it

in the middle or from the end. This is no empty boast, for without wishing to depreciate a thinker who is evidently an earnest man, we cannot call his book anything but a collection of aphorisms.

Some Pages of Levantine History. By the Rev. H. T. F. Duckworth. Pp. iv+149. (London: Alexander Moring, Ltd., n.d.) Price 3s. 6d. net.

PROF. DUCKWORTH commends his book "to those of his countrymen who have either made, or intend to make, a pilgrimage to the holy places of Christian and Classical Antiquity," and it should certainly be of service to them. As he was formerly assistant chaplain representing the Eastern Church Association in Cyprus, he writes from first-hand knowledge in many of his chapters. The text is illustrated with several good plates.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Root Action and Bacteria.

MR. SPENCER PICKERING's letter on the effect of soil sterilisation on the growth of apple trees (June 6, p. 126) is of interest in connection with experiments which have been made by Dr. Francis V. Darbishire and myself, and described in a paper read last year before the chemical section of the British Association. We find that most plants grow much better in heated than in unheated soils.

That the productiveness of a soil can be increased by heating was shown in 1888 by Frank, and has since been confirmed by other investigators besides ourselves. We have not yet been able completely to account for it. There is, beyond question, an increase in the total activity of the soil microorganisms; this is shown by the increased absorption of oxygen. There is also evidence that some chemical change takes place. Mustard grown in heated soil takes up a larger amount of nitrogen and of phosphorus, indicating an increased "availability" of some of the compounds of these two elements. One of our experiments gave the following results:—

		Yield of mustard in grams		Percentage composition of dry matter		
		Fre-h weight	Dry weight	N	P ₂ O ₅	K ₂ O
Heated soil	(a)	229.59	26.14	4.26	2.39	4.34
	(b)	226.15	24.04	4.80	2.01	5.07
Unheated soil	(a)	84.60	15.70	2.53	1.07	4.11
	(b)	88.70	16.05	2.09	0.92	4.29

Further, it is easy to show that heating increases the solubility both of the organic and of the inorganic matter in the soil. The actual change that takes place can only be ascertained when something more is known of the proximate constituents of the soil, and especially of the ill-defined colloidal bodies collectively known as humus.

The case is somewhat more complicated if the plant depends for part of its food on the activity of organisms which have been killed during the heating process. The increased "availability" of the plant food in the soil may or may not counteract the loss of the special organism; leguminous plants, and trees dependent on mycorrhiza, may therefore be expected to give irregular results.

A further complication may arise if the amount of calcium carbonate in the soil is insufficient. In certain circumstances humus is known to decompose and form bodies which, in absence of calcium carbonate, are injurious to plants. There is no evidence that a similar change does not take place on heating; on the contrary, one of Schulze's experiments (*Landw. Versuchs. Stat.*,

1906, lxx., 137) seems to show that it does. He found that heated pasture soil deficient in calcium carbonate gave a poorer crop of mustard than did the unheated soil, but on adding calcium carbonate the difference in crop disappeared. So far we have always worked with soils containing 3 per cent. or more of this substance, and no depressing effect has been observed, but it would be interesting to know how much was present in Mr. Pickering's soil. Unless there happened to be sufficient, the retardation in growth which he observed may well be due to some injurious body formed by heating the soil rather than to the absence of particular organisms.

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Unscientific Administration.

MAY I be allowed to offer a few words of comment on one point raised by Prof. Ronald Ross in his article appearing in this week's NATURE? No one can read his indictment of the Indian official attitude towards science without feeling that another voice crying in the wilderness is warning our administrators and governing classes of the dangers that await an unscientific nation that persists in the error of its ways. In explaining the cause of the present state of affairs, Prof. Ronald Ross says:—"... Lastly, it is due to our defective public education." May I amend the phrase by interpolating the words "school and university" between the last two words quoted? For surely it is not the mass of the people who are to blame, but rather those who are directing the affairs of the country. Our governing classes have up till now been mostly educated at public schools and the universities of Oxford and Cambridge. To the latter institutions I will not refer. The Editor of NATURE, Prof. Turner, and Prof. Perry, not to mention the council of the Royal Society and others, have done sterling service to the cause of scientific education in their attempts to stir up public opinion; but, notwithstanding a special memorial from the Royal Society, neither university has as yet, by altering its entrance examination, acknowledged that science forms an integral part in a liberal education.

But with regard to science teaching in public schools, of which I may claim several years' experience, it is not too much to say that the outlook is far from promising. Notwithstanding the fact that governing bodies have voted money, built laboratories, and insisted on a minimum at least of science teaching, not one single public school, using the term in its usual application, has for its headmaster a man scientifically trained. The Naval College at Dartmouth and one or two grammar schools are the exceptions which prove the rule.

As a result of this, no science master can ever hope to get a headmastership, and the best men, therefore, do not enter the teaching profession. I should be far from wishing to assert that headmasters are not, as a rule, anxious to do the best they can for science, although their sympathies are with literary subjects, but they cannot do more than allow facilities for boys to learn science. The great clog to progress lies at the door of the assistant masters, who are as a body decidedly anti-scientific. What science master has not heard the opinion confidently asserted that science is only suited to the minds of a small minority of boys? They cannot and will not admit that it can be made an educational instrument of any moment. Who could not mention cases of clever boys being warned not to "waste their time" over science? Was not Darwin himself publicly rebuked for the same offence when a youth at Shrewsbury School? But if chemistry and physics are useless, biology is positively harmful. I have been told that biology should never be taught to boys, since it must turn their minds towards questions of sex about which they should be kept in perfect ignorance! Finally, it is said that the introduction of "modern" subjects such as science has only brought about mental confusion and stagnation, and the sooner we go back to the old exclusively classical curricula the better.

It is not hard to imagine what will be the attitude of mind towards science if the present generation of officials, against whom Prof. Ronald Ross brings his complaints, are succeeded by those who are now at our public schools and